Trin & Stor

Model Numbers: S, S-SR, SL Series
Version Date: 2010-12-21

NEW PRODUCT LINE
Indirect Water Heaters
Stainless Steel
Stainless Steel Solar
Stone Lined

INDIRECT WATER HEATERS
INSTALLATION AND OPERATION INSTRUCTIONS
To be installed in conjunction with a NTI Boiler

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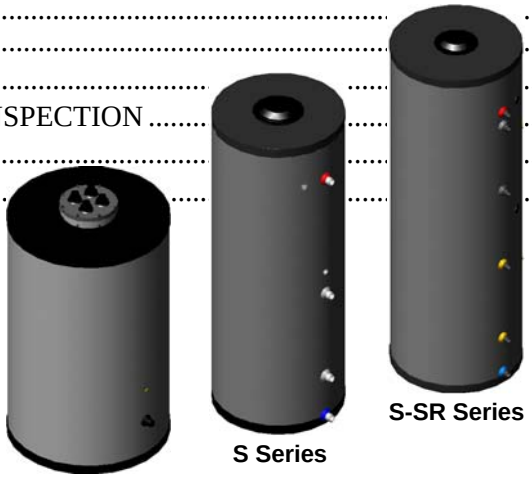


SL Series S Series S-SR Series

HAZARD SYMBOLS AND DEFINITIONS

⚠ DANGER Danger Sign: Indicates a hazardous situation which, if not avoided, will result in serious injury or death.

⚠ WARNING Warning Sign: Indicates a hazardous situation which, if not avoided, could result in serious injury or death.

⚠ CAUTION Caution Sign plus Safety Alert Symbol: Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

CAUTION Caution Sign without Safety Alert Symbol: Indicates a hazardous situation which, if not avoided, could result in property damage.

NOTICE Notice Sign: Indicates a hazardous situation which, if not avoided, could result in property damage.

⚠ WARNING This Indirect Water Heater must be installed by a licensed and trained Heating Technician or the **Warranty is Void.** Failure to properly install this unit may result in property damage, serious injury to occupants, or possibly death.

1.0 INTRODUCTION

NTI offers three (3) diversified series of Indirect Water Heaters: "S" Series consists of a high performance stainless steel tank and heat exchanger coil, "SL" Series offers a high mass stone lined tank and finned copper heat exchanger coil, and "S-SR" Series consists of a stainless steel tank with dual heat exchanger coils. The S-SR Series comes equipped with a Solar Domestic Hot Water backup via a second heat exchanger coil for boiler supply connections ("S-SR" models). The "S-SR" series can also be used with a single boiler as a normal indirect or with a second boiler for increased recovery rate. For the complete NTI Trin & Stor line, visit www.nythermal.com.

Trin & Stor Specifications

Table 1-1 Indirect Water Heater Specifications

Model	Storage Capacity (US Gal)	Type	Weight (lbs)		Hour 1 Recovery [3] (Gal @ Outlet Temp)		Boiler Output (MBH)	Coil Flow Rate (GPM)	Coil Drop (Feet)	Continuous Rate (GPH @ Outlet Temp)	
			Empty	Filled [1]	140 °F	115 °F				140 °F	115 °F
S40	40	Stainless Steel Indirect	71	485	228	303	146	6.9	1.0	196	271
S50	53		90	655	238	313	146	6.9	1.0	196	271
S80	79		115	995	356	468	210	10.4	3.0	292	404
S120	119		157	1275	485	636	290	13.6	5.0	392	542
S80SR ☀	79	Stainless Steel Solar Indirect	118	840	157 Upper	214 Upper	220	10.4	4.6	182 Upper	291 Upper
					166 Lower	274 Lower			4.8	193 Lower	307 Lower
S120SR ☀	119		177	1190	167 Upper	239 Upper	290	13.6	7.6	194 Upper	310 Upper
					177 Lower	274 Lower			8.0	205 Lower	328 Lower
SL35	35	Stone Lined Indirect	185	477	230	300	150	6.0	7.0	195	265
SL50	50		238	656	250	320	150	6.0	7.0	200	270
SL70	70		290	875	270	340	150	6.0	7.0	200	270

Notes:
1. Ensure the location chosen for the tank is capable of supporting the tank when filled with water.
2. Refer to Table 1-3 for a list of considerations when selecting a location for the tank.
3. Hour 1 Recovery based on 50°F inlet water temperature and 200°F boiler water outlet temperature.

Table 1-2 Indirect Water Heater Characteristics

Attribute	S Series		S-SR Series ☀		SL Series	
Tank [1]	stainless steel		stainless steel		stone lined	
Coil	stainless steel		stainless steel		copper finned	
Insulation	EPS foam		EPS foam		EPS foam	
Jacket	grey plastic		grey plastic		grey plastic	
Recommended Service Clearances	top	12"	top	12"	Top	36"
	connection side	12"	connection side	12"	connection side	12"
	boiler connections	as required	boiler connections	as required	boiler connections	as required
Restrictions	MAWP	150 psi	MAWP	150 psi	MAWP	150 psi
	Max tank temp	190°F	Max tank temp	190°F	Max tank temp	190°F
	Max boiler temp	210°F	Max boiler temp	210°F	Max boiler temp	210°F

Notes:
1. Water used in the tank must meet the water chemistry limits specified in Table 2-1. Levels outside the limits may corrode the tank and shorten its life resulting in damage to tanks and voiding the warranty.

I.O.M. Checklists

The various Installation, Operation and Maintenance (IOM) Checklists contained in this manual are meant to be read in conjunction with the details, drawings and safety information to ensure a complete and proper installation.

Pre-Installation Checklist ☑

Inspection and Preparation

1. Remove packaging. Inspect for damage during shipping.
2. Package contents should contain the following:
   - ☐ Indirect Water Heater (verify correct model number)
   - ☐ Plastic lid, screws, and insulation (applicable to "SL" Series only)
   - ☐ Temperature and Pressure Relief Valve (150psi)
   - ☐ TPI Thermostat
   - ☐ Brass tee, ¾" (applicable to "SL" Series only)

Locating the Tank

1. Solid foundation, dry location, near boiler.
2. Leave room to service water heater and controls (coil can be removed from the top of the "SL" series tanks).
3. Sufficient room for boiler piping and servicing boiler.
4. Area free of flammable liquids or combustible vapors.
5. Install where leaks will not damage property.
6. Locate in room where temperature never drops below 50°F (10°C).

Water Damage Protection

1. Make provisions to protect the surrounding area from water damage should a leak occur from the tank, fitting connections, or relief valve.
2. If the area surrounding the tank location is susceptible to water damage, install a catch pan c/w drain under the tank.

General Information

1. Review system specifications and characteristics.
2. Know the Water Chemistry and Warranty requirements.
3. Be informed of potential hazards associated with DHW.

DOs & DON'Ts

1. DO NOT install water heater close to high temperature appliances or wood stoves as water heater jacket is combustible.
2. DO NOT install where there is a risk of property damage in the event of an eventual leak at some unpredictable time.
3. DO support the entire tank bottom with ¾" plywood (min) if elevating off the floor with blocks.

General Installation Requirements

Generalized instruction and procedures cannot anticipate all situations. For this reason, only a qualified installer should perform the installation.

Users Responsibility – This manufacturer anticipates the proper installation and care in use of the product. As with any hot water system, there is a risk of property damage and personal injury inherent in the use. NTI cannot supervise the installation and therefore makes it a specific condition for the warranty that the customer will supervise the installation and use of the product to be sure they are performed in accordance with the instructions and I.O.M. Checklists in this manual. It is the User's responsibility to maintain the appliance by having it inspected on an annual basis, serviced as required, and to use the product for the purpose it was intended.

Installers Responsibility – A qualified installer is a licensed person who has appropriate training and a working knowledge of the applicable codes, regulations, tools, equipment and methods necessary to install an indirect water heater. The Installer assumes all responsibility for a safe installation and that it meets the requirements of this document, as well as National and local codes.

Consider the following when selecting a location for the Indirect Water Heater: All tanks will eventually leak at some unpredictable time, so take precautions and use a catch pan with a drain beneath the water heater to contain potential leaks or install the tank in a location not susceptible to water damage. Do not install near a wood stove where excessive heat could melt the water heater's plastic jacket. Boiler supply piping, floor drain locations, relief valve discharge will also need to be considered before selecting a location.

IMPORTANT

Scope of Instruction - This document pertains to the correct installation and operation of the NTI Trin & Stor Indirect Water Heater line, exclusively series "S" and "SL". This manual **DOES NOT** provide installation instructions for heating system boilers; therefore, installers must refer to the boiler manufacturers instructions for boiler installation procedures.

IMPORTANT

Emergency Situation - Should the water heater be subject to flood, fire or other damaging conditions, turn the power and water to the heater off. **DO NOT** place water heater in operation again until it has been thoroughly checked by qualified service personnel.

NOTICE

Code Requirements - The installation of your NTI Trin & Stor Indirect Water Heater must conform to the requirements in this manual, as well as National and local codes.

⚠ CAUTION

Intended Purpose - This appliance is not intended to convey or dispense water for human consumption such as drinking or cooking.

⚠ WARNING

Annual Service - Failure to have the Indirect Water Heater properly serviced and inspected on a regular basis by a qualified service technician may result in property damage, serious injury or death.

⚠ WARNING

Flammable Vapors - DO NOT install this appliance in any location where gasoline, flammable vapors or air-born contaminants are likely to be present.

⚠ WARNING

Warranty Requirements - Improper installation, use, neglect or abuse of this product may not only jeopardize the safe operation of this appliance but also void the warranty.

⚠ DANGER

Be Informed - Read and understand this manual prior to proceeding with the installation of the Trin & Stor Indirect Water Heater. Failure to follow the instructions outlined in this document will result in property damage, serious injury or death.

Safe Temperatures for Potable Water

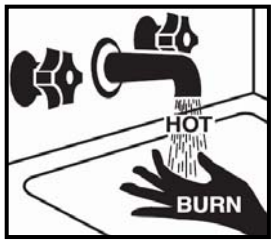
Two factors used to determine safe hot water temperatures are Legionella and scalding. Potable water needs to be stored at temperatures hot enough to limit the growth of Legionella, yet be cool enough to prevent scalding. Since both hazards present a potential risk to the user, they must be monitored and controlled. Table 1-4 indicates how water temperature affects Legionella bacteria and contributes to scald injury. Use of a thermostatic mixing valve in the indirect water heater plumbing system can help protect against both of these hazards. By storing potable water at higher temperatures, bacteria growth is controlled, while still providing high temperature water for dishwasher applications and low temperature water for bathing. Before proceeding, read the following carefully and take all necessary precautions to avoid potential illness and/or injury that can result from Legionella or scalding hazards.

⚠ WARNING **Legionella Hazard** - This bacteria is naturally occurring in surface water and ponds. It can also be found in man-made water systems around the world such as water storage tanks, water distribution systems, fountains, hot tubs, humidification systems, refrigeration systems and grocery produce misters. Health authorities agree that Legionella bacteria most often enter the lungs due to aspiration when contaminated water spray is breathed in as opposed to ingesting drinking water contaminated with the bacteria. Typical illnesses attributed to Legionella include flue like symptoms (Pontiac Fever) and a potentially fatal type of pneumonia (Legionnaires' disease). Failure to follow instructions may result in illness or death.

Contributing Factors to Legionella - Experts acknowledge that Legionella is an identified risk in most water systems. Although eradicating Legionella is improbable, precautions can be taken to control and monitor conditions that promote bacteria growth. According to the World Health Organization (WHO); American Society of Heating, Refrigeration, and Air-conditioning Engineers (ASHRAE); Canada Safety Council (CSC); and Centers for Disease Control (CDC), contributing factors to the growth of Legionella in potable water systems include:

- Minerals and nutrients present in the source water and systems materials
- Stagnation or low flow characteristic of dead ends in distribution piping systems and storage tanks
- Scale, corrosion, and bio film
- Tepid water in cold water lines
- Water storage temperatures optimal for bacteria growth
- Chlorine concentration

⚠ WARNING **Scald Hazard** - Hotter water increases the risk of scald injury. There is a hot water scald potential if the storage tank thermostat is set too high. Before changing the temperature setting on the tank thermostat, refer to the thermostat manufacturers recommended settings. Failure to follow these instructions may result in serious injury or death.



A scald injury can occur when hot steam or liquid makes contact with one or more layers of skin. Scald severity (degree of burn) is directly impacted by exposure time and temperature. Refer to Table 1-4. The following basic precautions are common sense:

- Young children and elderly adults burn more quickly and should use cooler water.
- Never leave a child alone while drawing water in a bathtub.
- Test the water temperature before bathing or showering.
- Turn cold water on first, then add hot water until the temperature is comfortable.

⚠ WARNING **Thermostatic Mixing Valve** - When the system requires water at temperatures higher than required for other uses, such as high temperature applications typically greater than 46°C (115°F), a means such as a thermostatic mixing valve shall be installed to temper the water for those uses in order to reduce scald hazard potential. Anit-scald devices such as a thermostatic mixing valve allows potable water to be stored at a higher temperature to limit bacteria growth, and allows water at the tap to be delivered at a lower temperature to prevent scalds. Failure to follow these instructions may result in serious injury or death.

⚠ CAUTION This appliance is not intended to convey or dispense water for human consumption such as drinking or cooking.

IMPORTANT **Legislation and Guidelines** - At the time this document was written, standards and guidelines regulating the prevention of Legionella in the United States and Canada were mostly voluntary. The American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE) is currently in the process of converting its guideline entitled "Minimizing the Risk of Legionellosis Associated with Building Water Systems" (ASHRAE Guideline 12-2000) into an official standard. Consult with your local authorities as to recommended guidelines for controlling Legionella in potable water systems.

NOTICE Storing water at temperatures ≥140°F may not be permitted in some States, so check with the authorities having jurisdictions. In Canada, recent changes to the National Plumbing Code requires that domestic hot water be stored at or above 61°C (140°F) and then mixed down to safe temperatures at the tank outlet.

General Guidelines - In the absence of a National standard or local codes, the following are general guidelines for "good practice" on maintaining, monitoring and operating your potable water system:

- Store domestic hot water at temperatures ≥ 61°C (140°F).
- Store and distribute cold water at temperatures below 20°C (68°F).
- System supply for uses other than high temperature applications typically greater than 46°C (115°F) shall be equipped with a thermostatic mixing valve on the hot water outlet to reduce potential scald hazards.
- Clean aerators and nozzles on water fixtures on a regular basis to reduce scale build-up.
- Clean storage tanks and remove sediment. Flush storage tanks and piping systems regularly for 10-30 minutes at high water temperatures (depending on guidelines used) to rid the system of sediment and scale that develops, typically in the bottom of storage tanks where water temperature is coolest; and piping runs where water can stagnate.
- Abandoned water lines should be capped off at the distribution main, not at the most convenient place.
- Avoid dead-ends in piping system. If unavoidable, provide a drainage port in these areas at the lowest point to flush out stagnant water regularly.
- Insulate Domestic Hot Water recirculation lines and keep pipe runs as short as possible.
- Recommend annual water testing of water in your tank and piping system(s) to monitor water conditions.
- Keep a maintenance record of when your indirect water heater and storage tank were cleaned, piping systems flushed and who did the service work.

Table 1-4 How Water Temperature relates to Legionella and Scald Hazard

Water Temperature [1]		Legionella Bacteria [1]	Water Temperature [2,5]		Exposure Time vs Burn [5]
158-176°F	70-80°C	Disinfection range	158°F	70°C	1 second - 2nd or 3rd degree burn
140-149°F	60-65°C	Bacteria die within minutes	140°F	60°C	5 seconds - 2nd or 3rd degree burn
122-131°F	50-55°C	Bacteria die within hours	131°F	55°C	5 seconds - 1st degree burn
68-113°F	20-45°C	Bacteria thrive and multiply	122°F	50°C	1 minute - 1st degree burn
below 68°F	below 20°C	Bacteria is dormant	111°F	44°C	5 hours - 1st degree burn [3,4]

Notes:

[1] Published by Chartered Institute of Plumbing and Heating Engineering, Databyte series, "Safe Hot Water Temperatures".
[2] The elderly and small children are susceptible to bad burns at shorter exposure times than listed in this table.
[3] A thermostatic mixing valve should be installed on DHW storage tanks when outlet temperatures exceed 115°F [46°C].
[4] Typical water temperature for bathing or showering range between 98-113°F [37-45°C].
[5] Temperature-Time-Burn Chart published by John Hopkins University, excluding notes.

2.0 WATER HEATER PIPING

⚠ WARNING Failure to follow the instructions provided in this section will void your NTI warranty and may result in property damage, fire, serious injury or death.

Domestic Side Piping

The various series of NTI Trin & Stor indirect water heaters are dimensioned and connection ports marked in Figures 2-1 and 2-2. Dimensioned drawings are to be read in conjunction with Table 2-3 and 2-4 which identify the connection type and port size and illustrates typical domestic water piping for a single indirect water heater. Basic system components are identified in Table 2-2 and their function described in detail below. For multiple Indirects, pipe the tanks in parallel using equal pipe lengths between each tank and a common tee to ensure equalized draw.

Energy Efficiency - Although the NTI Trin & Store Indirect Water Heater is an energy efficient appliance, insulating long pipe runs can improve the system efficiency by conserving energy and reducing standby losses.

System Preparation - Prior to connecting plumbing to the indirect water heater, flush the entire system to ensure it is free of impurities that may be harmful to the system or indirect water heater. Check the water composition of the domestic water supply prior to filling the tank to ensure the water characteristics are within the range specified in Table 2-1. Water used in the tank must meet the water chemistry limits specified in Table 2-1. Levels outside the limits may corrode the tank and shorten its life resulting in damage to the tank and voiding the warranty. If levels are outside the acceptable limits, consult a qualified water treatment expert about treatment options for domestic water.

NOTICE Damage to tanks resulting from water chemistry levels outside the ranges specified in Table 2-1 can cause corrosion, shorten the life of the tank, and will void the warranty.

Table 2-1 Water Chemistry Requirements

Characteristic	"S" series		"S-SR" series		"SL" Series [1]	
PH	Min	6.0	Min	6.0	Min	n/a
	Max	8.0	Max	8.0	Max	n/a
Chloride (ppm)	Min	0.0	Min	0.0	Min	n/a
	Max	80.0	Max	80.0	Max	n/a

Notes:
[1] The "SL" Series is not affected by abnormal PH or Chloride levels.
[2] Residual solder flux can corrode stainless steel. Flush tank before heating the domestic water in the tank or warranty will be void.

CAUTION **Flushing the Water Heater**

Many solder fluxes can severely corrode stainless steel. Once piping connections are completed, flush the water heater by drawing at least three (3) times the tank's volume through the water heater prior to heating water in the tank. Failure to flush the tank will void the warranty.

System Components - As a minimum, a properly installed system will include the following major components identified in Table 2-2. It is the responsibility of the installing contractor and system designer to consider all aspects of a proper system design including compliance with local codes, including additional components required for prevention of thermal-siphoning (i.e. heat traps), isolation valves, drain and purge valves, etc.

Table 2-2 Domestic Side Major Component Checklist

Factory Supplied Components	Field Supplied Components
☐ Indirect Water Heater	☐ System Backflow Preventor [2]
☐ Temp & Pressure Relief Valve (150PSI)	☐ DHW (Potable Water) Expansion Tank [2,3]
☐ TPI Thermostat [1]	☐ Thermostatic (Anti-Scald) Mixing Valve
	☐ Drain Valve

Notes:
[1] All NTI Indirect Water Heaters come standard with a TPI thermostat control (not applicable for solar applications).
[2] Check if required by local codes.
[3] Expansion Tank is mandatory if using a System Backflow Preventor.

Indirect Water Heater - NTI Trin & Stor Indirect Water Heaters are equipped with a single-walled internal heat exchanger coil. To maintain the efficient and reliable operation of the heat exchanger, and to avoid heat exchanger failure, it is critical to ensure the rules and guidelines in this section are followed.

NOTICE Locate the water heater in an area where leakage from the tank or plumbing connections will not result in water damage to adjacent areas or lower floors. If such a location is unavoidable, install a suitable catch pan with a drain under the appliance. This manufacturer is not responsible for any water damage that may occur in connection with the indirect tank or any of its components.

Temperature and Pressure Relief Valve - Each Indirect comes standard with a factory supplied temperature and pressure relief valve, sized to ASME specifications and compliant with Standard ANSI Z21.22•CSA 4.4 Relief Valves for Hot Water Supply Systems. The field installed relief valve and discharge piping is to be mounted on the Indirect Water Heater in accordance with Figures 2-3 and 2-4 and must be accessible for servicing or replacement. No valve is to be placed between the Relief Valve and the Indirect Water Heater or Relief Valve and discharge pipe. Install discharge piping as shown in Figures 2-3 and 2-4 and in accordance with Installation Checklist 2-1.

CAUTION **T&P Normal Operation** - The relief valve is not intended for constant duty such as repeated operation due to normal system expansion. If this occurs, correct the situation by installing a properly sized domestic expansion tank as per the expansion tanks manufacturer's instructions.

⚠ WARNING **Location** - Do not conceal, plug, or remove the relief valve from its designated point of installation. Failure to comply may result in property damage, personal injury or death.

TPI Thermostat - The TPI is an immersion thermostat designed to allow a conventional water heater or boiler to monitor and control the Indirect Water Heater's tank temperature, improve response time, and prevent short cycles of operation. Install the TPI on the Indirect tank as per the TPI Thermostat Wiring Instruction in Section 3.0 of this manual. For the Solar "SR" series, the TPI is only applicable when used as a normal indirect. For controllers suitable for Solar Indirect applications, refer to the NTI Sol-R-Therm manual.

Drain Valve - The Indirect water heater requires a field supplied drain valve to facilitate emptying the tank for inspection and servicing. Refer to Table 2-4 for drain port size and type.

System Backflow Preventor - Check if a backflow preventor (BFP) is required by local codes. Most plumbing codes require a thermal expansion control device be installed if a backflow preventor, pressure reducing valve or check valve is installed on a domestic supply line. If a backflow prevention device is used, then an expansion tank is mandatory (not optional) and must be installed downstream of any device used to control system thermal expansion. When using multiple indirects, check if a single BFP is required on the domestic supply or if each tank requires it's own backflow preventor and respective expansion tank. See Figures 2-3 and 2-4.

DHW (Potable Water) Expansion Tank - This manufacturer recommends installing an expansion tank in the domestic hot water system for the purpose of absorbing the increase in water volume caused by rising water temperature. If required by local codes, the expansion tank must be suitable for use with potable water and be sized in accordance with the water volume of the system and the firing rate of the boiler connected to the indirect water heater. Refer to the expansion tank manufacturer's literature for proper sizing information.

⚠ CAUTION **Isolation Valves** – Ensure any valves installed between the expansion tank and indirect tank inlet are left in the OPEN position during normal operation. Failure to follow these instructions may result in discharge of the Relief Valve and result in property damage or personal injury.

Thermostatic (Anti-Scald) Mixing Valve - A mixing valve is recommended on branches supplying low temperature water to endpoint plumbing fixtures when domestic hot water is stored above 46°C (115°F).

⚠ WARNING **Temperature Limiting Device** - When the tank requires water at temperatures higher than 46°C (115°F), a mixing valve shall be installed to temper the water and reduce the risk of scalding. Failure to follow these instructions may result in serious injury or death.

Boiler System Piping

The NTI Trin & Stor line of high efficiency Indirect Water Heaters are intended to be heated by an external hot water boiler where hot water supplied from the boiler is connected to ports 4 and 5 on the indirect tank, and circulated through an internal heat exchanger coil in the tank. See Figures 2-3 and 2-4. The tanks are specifically designed for low temperature applications [<100°C (210°F)] and are NOT intended to be used as a pool heating system or in conjunction with steam boilers or other high temperature appliances where water temperatures could potentially exceed 100°C (210°F). Refer to the Installation and Operation Manual included with the boiler for detailed instructions on connecting boiler system piping to the indirect water heater.

WARNING **High Temperature Applications** - Trin & Stor Indirect Water Heaters are not to be used for high temperture applications [greater than 100°C (210°F)] or in conjunction with steam producing systems as this will void the warranty. Failure to follow these instructions may damage the tank resulting in property damage, serious injury or death.

Solar System Piping

The NTI Trin & Stor "S-SR" line of high efficiency Solar Indirect Water Heaters is intended to be heated by a solar thermal system where a propylene glycol mixture, heated by the solar collectors, is circulated through the internal heat exchanger coil in the tank. This manual does not cover installation of solar thermal system piping. If installing a Solar Indirect Water Heater as part of an NTI Packaged Solar Domestic Hot Water System, refer to the NTI Sol-R-Therm Manual for detailed instructions regarding Solar System Piping.

Domestic side piping for solar thermal can be done in a number of configurations depending on the application. Since solar tanks are specifically designed for high temperature applications in the event of collector stagnation and overheating, tank sensors specifically designed for these high temperature applications must be used instead of the TPI.

IMPORTANT **TPI Applications** - The TPI thermostat control is compatible with any Trin & Stor tank, including "S-SR" models, when used as normal indirect water heaters. The TPI is not intended for use with Solar Domestic Hot Water Systems. An alternate sensor and thermostat control, normally provided with the solar thermal system, should be used.

Pre-heat Option - The most common application is where the solar water heater is plumbed in series with an auxiliary water heater which is used as the primary storage tank. The hot water out (connection port 2) of the solar water heater is connected to the cold water inlet of the auxiliary water heater, so when there is a demand for domestic hot water, the auxiliary water heater immediately brings in pre-heated water from the solar tank to replace it instead of cold water directly from the potable water system. In this configuration the upper heat exchanger coil is not required so connection ports 4 and 5 should be capped or plugged with a brass fitting. Refer to Figure 2-4 and Table 2-1 respectively for location and sizes of connection ports for applicable solar models.

Back Up Option - This option is used when the solar water heater is the primary storage tank and solar water heating alone is not enough to meet the domestic hot water demand. Hot water supplied from the boiler is connected to ports 4 and 5 on the solar water heater and circulated through the upper heat exchanger coil in the tank. See Figure 2-4. Refer to the Installation and Operation Manual included with the boiler for detailed instructions on connecting boiler system piping to the indirect water heater.

Storage Option - This option is used when the solar water heater is the primary storage tank and is connected to an additional storage tank for use as extra storage or as a dump zone for excess heat. In this method, hot water from the solar water heater is transferred to the secondary storage tank using connections 4 and 5. Note that flow direction is reversed for this application compared to the back up option. See Figure 2-4.

Figure 2-1 Indirect Water Heater Dimensions

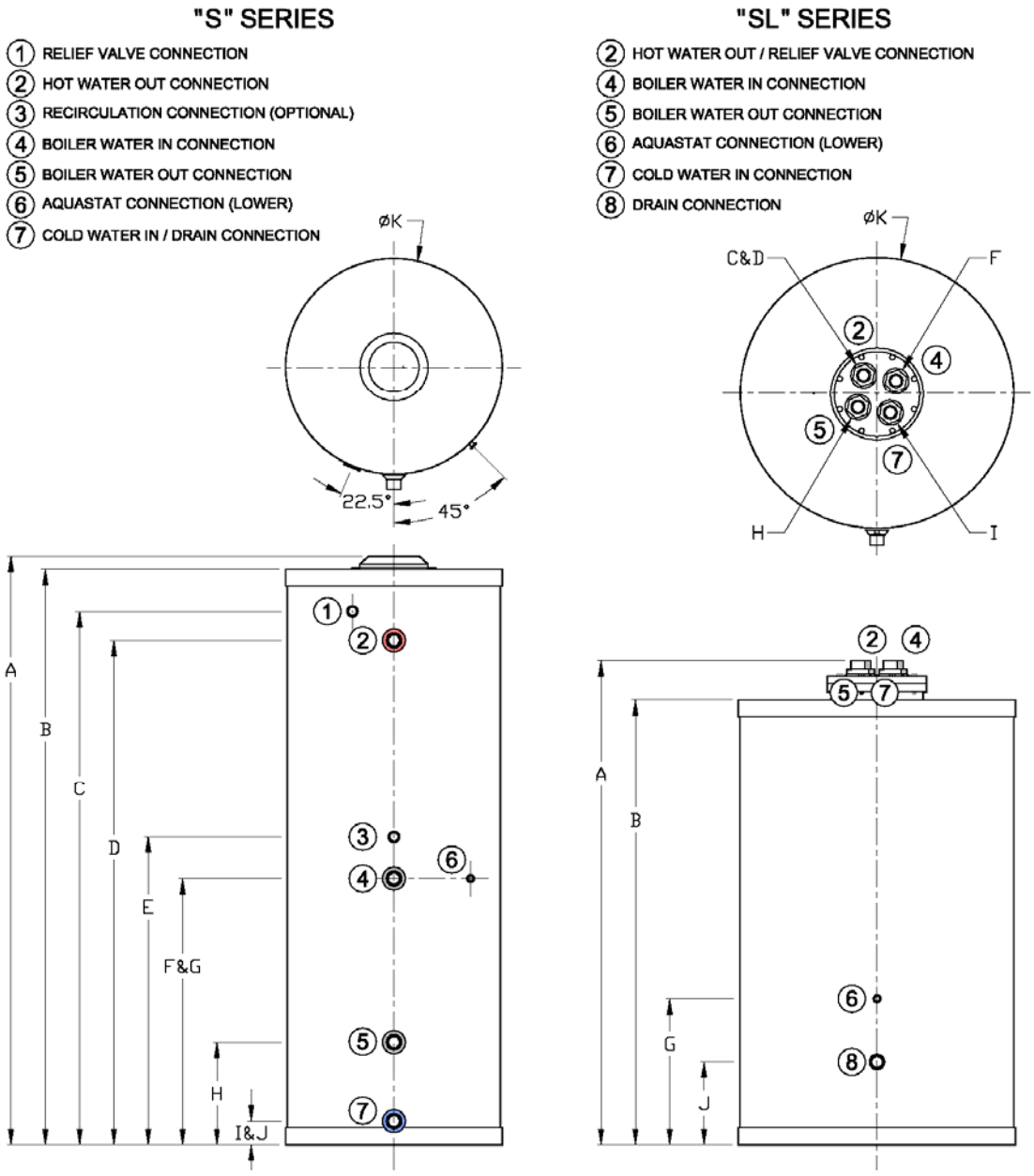
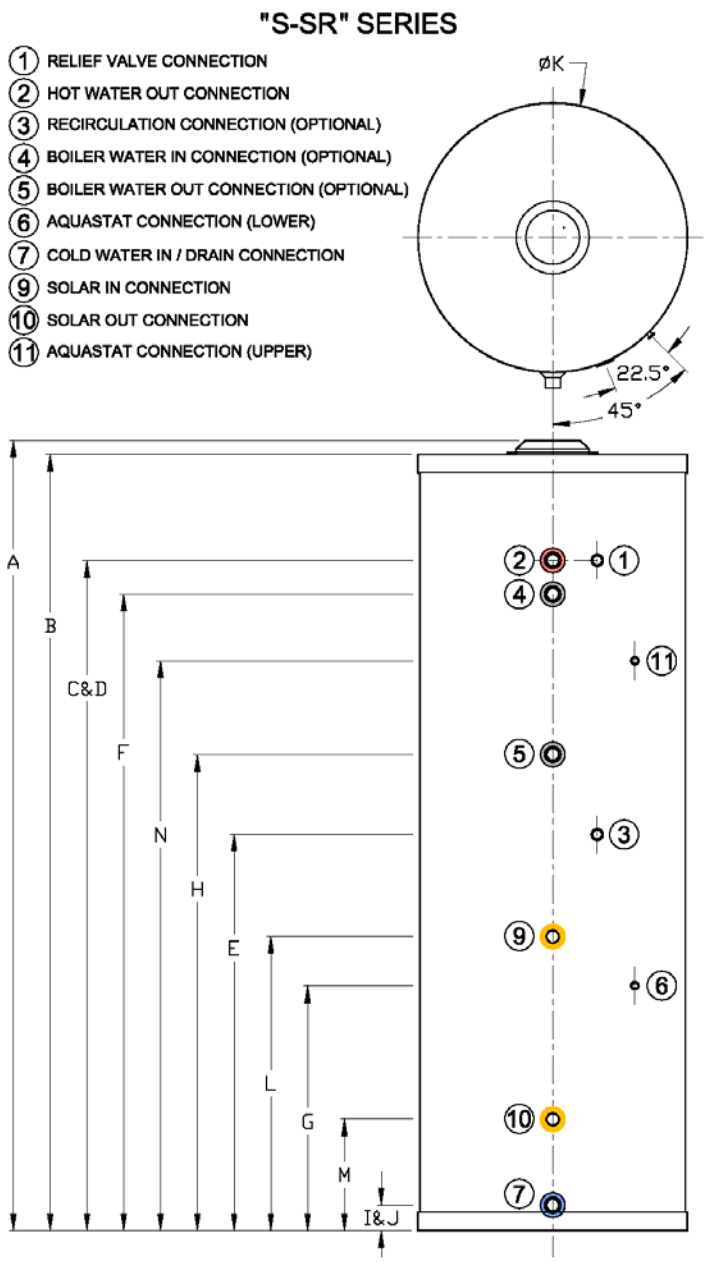


Table 2-3 Indirect Water Heater Dimensions

Model	Dimensions (inches)													
	A	B	C	D	E	F	G	H	I	J	K	L	M	N
S40	56	54 3/4	46 3/4	46 3/4	29 1/8	25 1/8	26 1/8	9 3/8	2 1/8	2 1/8	20 1/8	-	-	-
S50	49	47 3/4	39 3/4	39 3/8	29 5/8	26	27	9 7/8	2	2	23 7/8	-	-	-
S80	70 1/4	69	60 7/8	60	35	29 5/8	30 5/8	10 3/4	2 3/8	2 3/8	23 7/8	-	-	-
S120	-	64 3/4	53 5/8	53 1/4	44 5/8	40 5/8	41 5/8	12 1/4	2 3/8	2 3/8	28 7/8	-	-	-
S80SR	70 1/4	68 7/8	59 1/2	59 1/2	35 1/8	56 1/2	21 3/4	42 1/4	2	2	23 7/8	26 1/8	9 7/8	50 1/2
S120SR	-	64 3/4	52 3/8	52 3/8	31 3/8	49 1/4	22 1/2	35 1/8	2	2	28 3/4	57 5/8	11 1/2	46 1/8
SL35	43 1/4	40 1/4	43 1/2	43 1/2	-	43 1/8	13 7/8	43 3/8	43 1/4	7 7/8	22 1/4	-	-	-
SL50	43 3/4	40 3/4	44	44	-	43 5/8	13 7/8	43 7/8	43 3/4	7 7/8	26	-	-	-
SL70	48 3/4	45 3/4	49	49	-	48 5/8	13 7/8	48 7/8	48 3/4	7 7/8	28	-	-	-

Figure 2-2 Solar Indirect Water Heater Dimensions



Installation Checklist ☑

1. Install domestic side piping as per National and local codes. Refer to Figures 2-3 and 2-4.
2. Do not over tighten brass threads on water supply connections.
3. Do not apply heat to the cold water inlet on the indirect water heater.
4. Mark the water supply for future reference.
5. Install a mixing valve on the hot water outlet of the water heater as shown in Figure 2-3 and 2-4.
6. Install boiler water connections (if used) as per the boiler manufacturer's instructions.
7. Cap (plug) any unused connection ports, such as domestic hot water recirculation.
8. Install T&P relief valve on tank in accordance with local codes and Figures 2-1 through 2-4.
9. Ensure no valve is installed between the relief valve and indirect water heater or discharge pipe.
10. Ensure discharge piping material used is rated to withstand temperatures up to 250°F (120°C).
11. Direct discharge to a safe area (drain) where hot water or steam will not cause damage or injury.
12. Terminate discharge pipe 6"-12" above the floor. Do not connect discharge pipe directly to a drain.
13. Typical discharge pipe diameter ¾". Maximum pipe length is 15 feet with 2 or less elbows.
14. Cut discharge end of pipe at a 45° angle to reduce the risk of being blocked or capped.
15. Install drain valve in the location and orientation shown in Figures 2-3 and 2-4.
16. Verify with local codes if a backflow preventor or thermal expansion control device is required.
17. Install a domestic expansion tank downstream of the backflow preventor (control device).
18. Install the domestic expansion tank on the cold water supply of the domestic side piping.
19. Flush the tank thoroughly before filling to heat water. Fill heat exchanger coil with heating fluid.

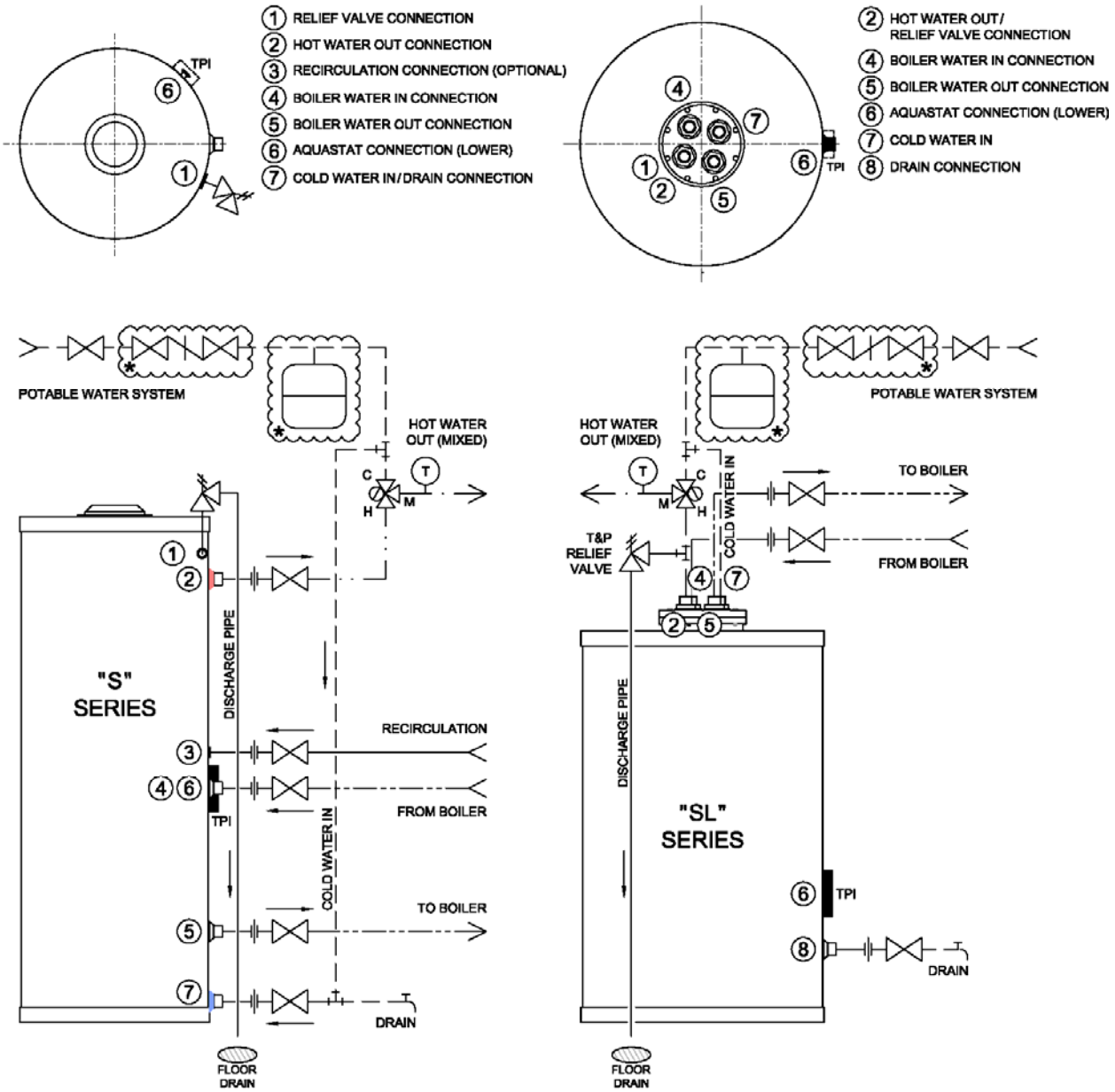
Table 2-4 Indirect Water Heater Connections

Model	Connection Port Sizes										
	T&P RV	Hot Out	Recirc	Boiler In	Boiler Out	A-stat Lw	Cold In	Drain	Solar In	Solar Out	A-stat Up
	1	2	3	4	5	6	7	8	9	10	11
S40	¾" F	1" M	¾" F	1" M	1" M	Well	1" M	-	-	-	-
S50	¾" F	1" M	¾" F	1" M	1" M	Well	1" M	-	-	-	-
S80	¾" F	1 ½" M	¾" F	1" M	1" M	Well	1 ½" M	-	-	-	-
S120	¾" F	1 ½" M	¾" F	1" M	1" M	Well	1 ½" M	-	-	-	-
S80SR ☀	1" F	1" F	1 ¼" F	¾" M	¾" M	Well	1" M	-	¾" M	¾" M	Well
S120SR ☀	1" F	1 ¼" M	1 ¼" F	¾" M	¾" M	Well	1 ¼" M	-	¾" M	¾" M	Well
SL35	-	¾" M	-	¾" M	¾" M	Well	¾" M	¾" F	-	-	-
SL50	-	¾" M	-	¾" M	¾" M	Well	¾" M	¾" F	-	-	-
SL70	-	¾" M	-	¾" M	¾" M	Well	¾" M	¾" F	-	-	-

* Connections are NPT unless noted otherwise. All Aquastat connections are friction fit immersion wells.

Figure 2-3 Indirect Water Heaters

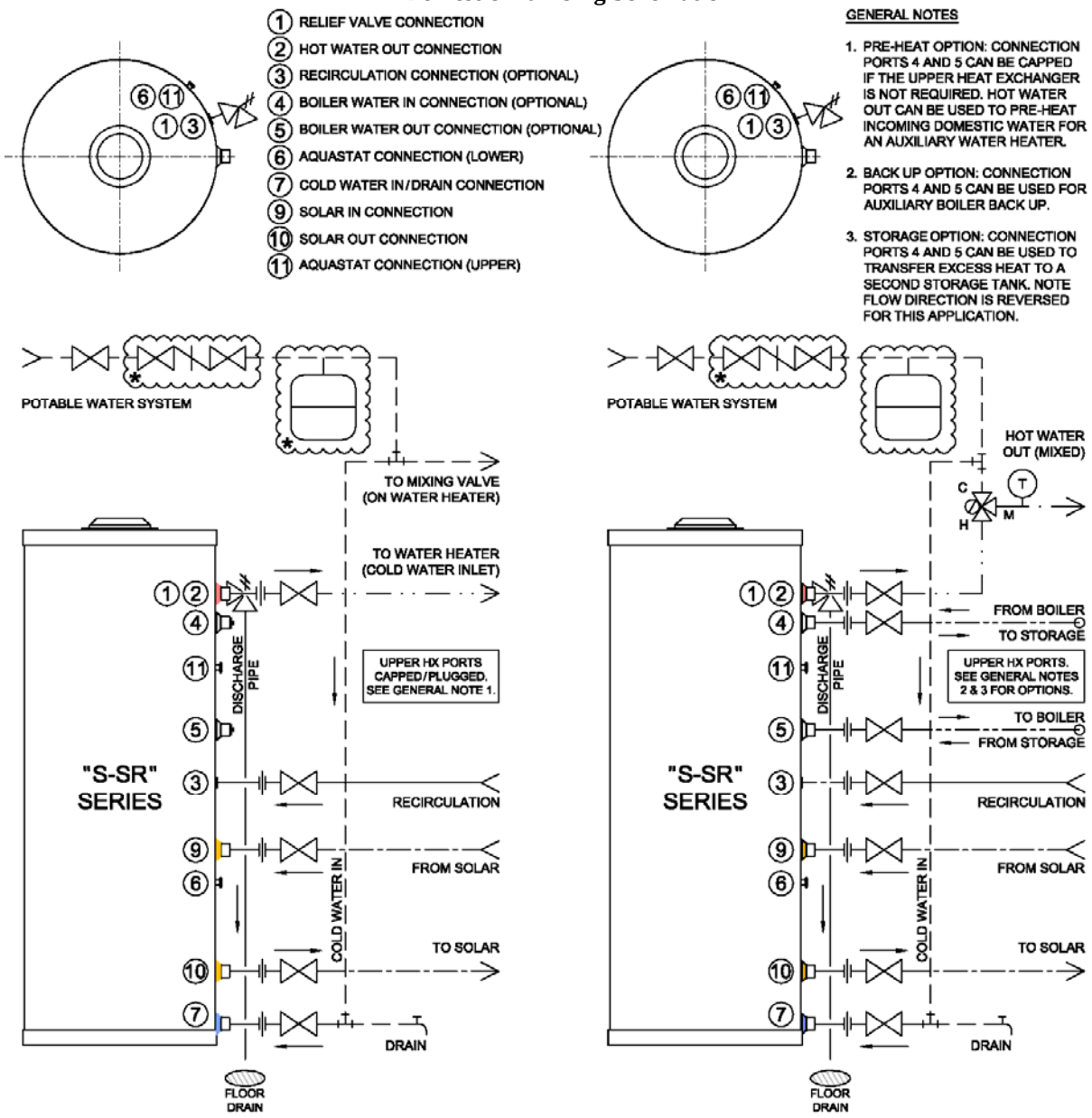
Domestic Plumbing Schematic



LEGEND					
SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
	DOMESTIC COLD WATER	C H M	THERMOSTATIC MIXING VALVE		DRAIN VALVE
	DOMESTIC HOT WATER (MIXED)		TEMPERATURE AND PRESSURE RELIEF VALVE		UNION
	DOMESTIC HOT WATER	T	TEMPERATURE GAUGE		TEE
	BOILER LOOP		EXPANSION TANK	*	CHECK LOCAL CODES
	DHW RECIRCULATION (OPTIONAL)		ISOLATION VALVE		FLOOR DRAIN
TPI	THERMOSTAT CONTROL (AQUASTAT CONNECTION)		BACKFLOW PREVENTOR		OPTIONAL
	FLOW DIRECTION				

Figure 2-4 Solar Indirect Water Heaters

Domestic Plumbing Schematic


1 RELIEF VALVE CONNECTION
2 HOT WATER OUT CONNECTION
3 RECIRCULATION CONNECTION (OPTIONAL)
4 BOILER WATER IN CONNECTION (OPTIONAL)
5 BOILER WATER OUT CONNECTION (OPTIONAL)
6 AQUASTAT CONNECTION (LOWER)
7 COLD WATER IN/DRAIN CONNECTION
9 SOLAR IN CONNECTION
10 SOLAR OUT CONNECTION
11 AQUASTAT CONNECTION (UPPER)
GENERAL NOTES
1. PRE-HEAT OPTION: CONNECTION PORTS 4 AND 5 CAN BE CAPPED IF THE UPPER HEAT EXCHANGER IS NOT REQUIRED. HOT WATER OUT CAN BE USED TO PRE-HEAT INCOMING DOMESTIC WATER FOR AN AUXILIARY WATER HEATER.
2. BACK UP OPTION: CONNECTION PORTS 4 AND 5 CAN BE USED FOR AUXILIARY BOILER BACK UP.
3. STORAGE OPTION: CONNECTION PORTS 4 AND 5 CAN BE USED TO TRANSFER EXCESS HEAT TO A SECOND STORAGE TANK. NOTE FLOW DIRECTION IS REVERSED FOR THIS APPLICATION.
POTABLE WATER SYSTEM
TO MIXING VALVE (ON WATER HEATER)
TO WATER HEATER (COLD WATER INLET)
UPPER HX PORTS CAPPED/PLUGGED. SEE GENERAL NOTE 1.
DISCHARGE PIPE
"S-SR" SERIES
RECIRCULATION
FROM SOLAR
COLD WATER IN
TO SOLAR
DRAIN
FLOOR DRAIN
HOT WATER OUT (MIXED)
FROM BOILER
TO STORAGE
UPPER HX PORTS. SEE GENERAL NOTES 2 & 3 FOR OPTIONS.
TO BOILER
FROM STORAGE

LEGEND					
SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
	DOMESTIC COLD WATER	C H M	THERMOSTATIC MIXING VALVE		DRAIN/FILL VALVE
	DOMESTIC HOT WATER (MIXED)		TEMPERATURE AND PRESSURE RELIEF VALVE		UNION
	DOMESTIC HOT WATER	T	TEMPERATURE GAUGE		TEE
	BOILER / STORAGE (OPTIONAL)		EXPANSION TANK	*	CHECK LOCAL CODES
	DHW RECIRCULATION (OPTIONAL)		ISOLATION VALVE		FLOOR DRAIN
	SOLAR GLYCOL LOOP (PUMP TO TANK)		BACKFLOW PREVENTOR		OPTIONAL
	FLOW DIRECTION				

3.0 FIELD WIRING

Ensure all field wiring complies with this manual and is installed in accordance with the National Electrical Code ANSI/NFPA 70 or Canadian Electrical Code CSA C22.1, and any applicable local codes.

TPI Thermostat Wiring

24VA Transformer (Hot, GND) - The TPI requires a 24VAC power supply to function. This power supply may be provided directly from the boiler (check with boiler manufacturer's instructions) or via a field provided 24VAC transformer. See Figured 3-6 to 3-9. Note the TPI may draw up to 0.6 W

Pump/TT Output Contacts - The TPI is equipped with a normally open isolated end switch (Pump/TT) that closes when the tank temperature drops below the TPI setting. Connect the Pump/TT contact to the DHW specific input on boilers equipped with DHW priority capabilities (Figures 3-6 to 3-7) or to the priority zone input on zone controllers Figure 3-9. Alternately, the Pump/TT contact could be used to power a zone valve, see Figure 3-8. Note the Pump/TT contact is rated for 125V@10A.

Install the TPI Thermostat in accordance with these instructions, the installation checklist(s) in this section, and corresponding Figures 3-1 to 3-5.

IMPORTANT

TPI Applications - The TPI thermostat control is compatible with any Trin & Stor tank, including "S-SR" models, when used as normal indirect water heaters. The TPI is not intended for use with Solar Domestic Hot Water Systems. An alternate sensor and thermostat control, normally provided with the solar thermal system, should be used.

⚠ WARNING

Avoid Shocks - To avoid electrical shock, turn off electrical power prior to opening any electrical box on the unit. Ensure the power remains off while any wiring connections are being made. Failure to follow these instructions may result in component failure, serious injury or death.

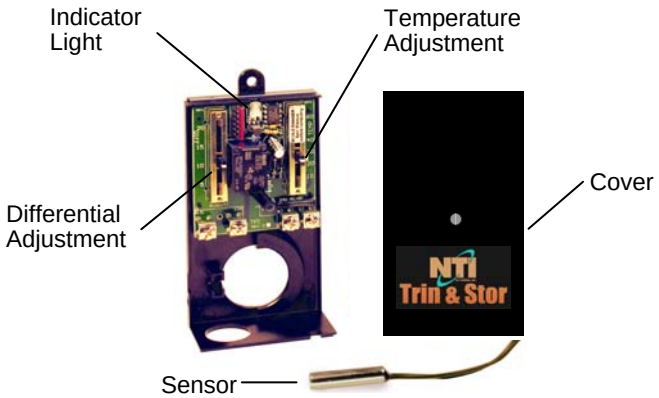
⚠ WARNING

Wire Protection - When passing 110VAC wiring through the TPI housing, the installer must use appropriate conduit and a chase nipple to secure the wiring and prevent chafing. Failure to follow these instructions may result in serious injury or death.

⚠ WARNING

Component Damage - DO NOT use the TPI if it has been under water. Failure to replace electrical damaged components may result in component failure, serious injury or death

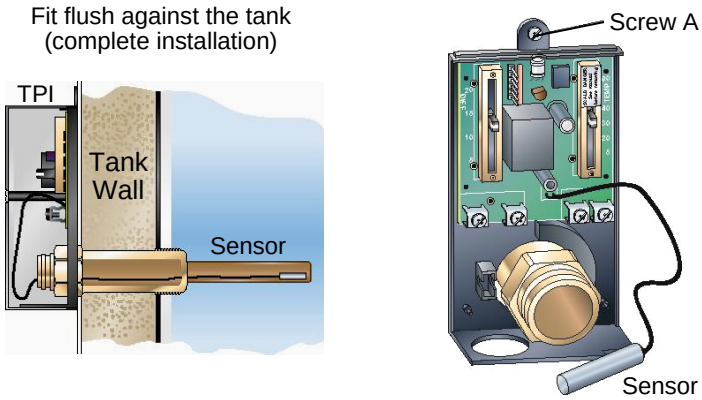
Figure 3-1 TPI Thermostat



Features

- Dimensions 5.0"H x 2.6"W x 1.7"D
  Control voltage 24VAC
  Maximum control power 0.6 W
  TT contact rating 125V, 10A
- Adjustment increment 1°F.
  Temperature set point range 110°F to 160°F.
  Temperature differential range 5°F to 20°F.
  10k sensor accurate to within 2 degrees.
- Fits any standard immersion well, no special adapter required. Mounts to tank using self taping screw provided.
- Indicating light provides status of power, call for heat, up to temperature, normal operation

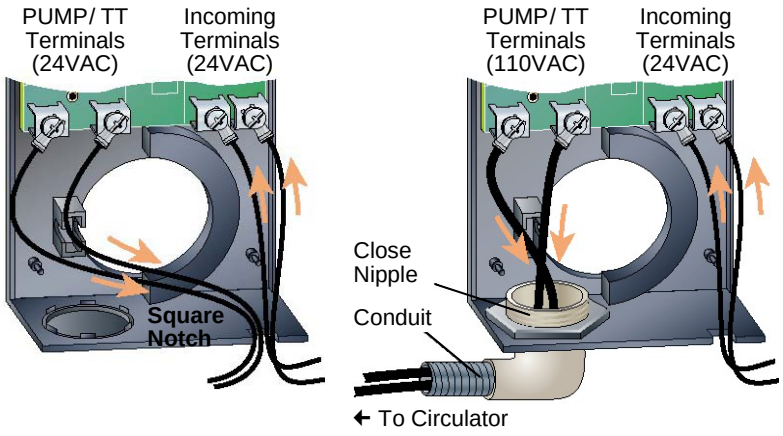
Figure 3-2 Installing the Sensor



Installation Checklist ☑

1. Place the hole located in the back of the TPI over the immersion well.
2. Mount the TPI flush against the tank.
3. Use the self-tapping screw provided (Screw A) to attach the TPI to the exterior of the tank.
4. Slide the temperature sensor all the way into the immersion well until it contacts the end. The sensor will measure temperature adequately by resting against the bottom of the immersion well. A complete installation does not need the sensor to make intimate contact with the entire well surface to work properly. Sensor is soldered directly to TPI so DO NOT bend sensor connection sharply or overwork it.

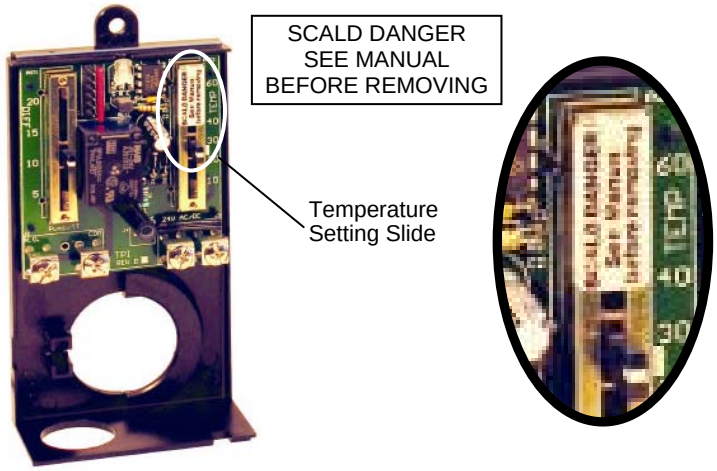
Figure 3-3 Wiring the Controls



Installation Checklist ☑

5. Turn off electrical power supply to water heater. Run all 24VAC wiring thru the square notch in bottom of TPI case.
6. Connect incoming 24VAC supply to 24VAC Terminals on the bottom right corner of TPI.
7. Connect 24VAC PUMP/TT outgoing wiring to terminals on the bottom left corner of TPI.
8. If using 110VAC PUMP/TT output wiring, use knockout at bottom of TPI case with appropriate chase nipple.
9. Refer to Figures 3-6 through 3-9 for TPI and Boiler control configuration drawings.

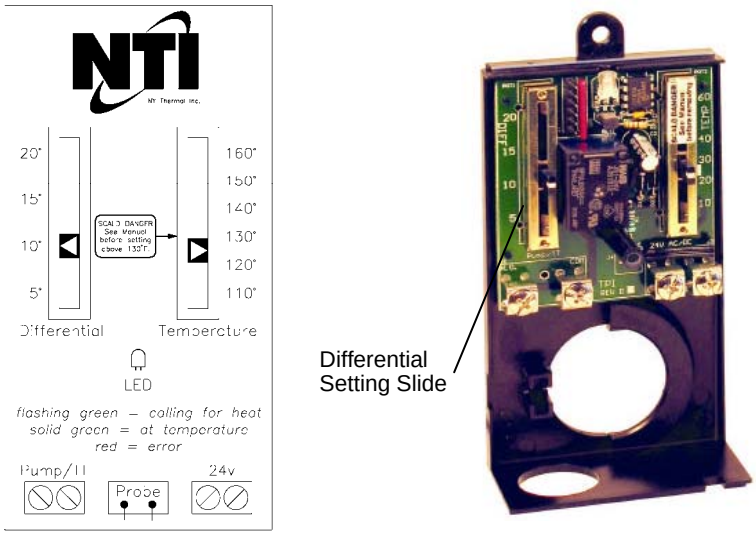
Figure 3-4 Adjusting the Temperature



Installation Checklist ☑

10. Locate the temperature setting slide on the right-hand side of the TPI. The Factory setting is 120°F (49°C). To adjust the temperature setting, slide the lever to the desired setting using the indicator scale. Normal range is 100°F to 140°F.
11. If domestic hot water is to be stored at temperatures above 115°F (46°C), an anti-scald mixing valve shall be installed on the tank's hot water outlet to mix the water down to safe temperature levels.
12. If setting temperature above 140°F, read "Safe Temperatures for Potable Water" before removing the SCALD DANGER label on the temperature slide. Higher water temperatures mandatory in Canada may not be permitted in certain US jurisdictions.

Figure 3-5 Operation and Differential



Installation Checklist ☑

13. Locate the differential setting slide on the left-hand side of the TPI. Factory setting is 10°. Slide the lever to the desired setting, using the indicator scale.
14. The TPI will close the output contact (call for DHW) when the temperature drops below the setting minus the differential. A small differential with high water setpoints can result in boiler cycling and reduce efficiency.
15. Once wiring is complete, turn on electrical power. Indicator light at the top of the case will be solid green if powered.
16. Replace TPI cover and secure with Black Screw provided.
17. Check water temperature at faucet to verify desired temperature is achieved.

TPI and Boiler Controls

TPI connected to Boiler with DHW Input - TPI output contacts "Pump/TT" are connected to the boiler's dedicated DHW input. Typically the boiler will achieve DHW priority via circulator control (refer to boilers I&O manual). 24VAC is provided by a field supplied transformer or via a 24VAC supply from the boiler (refer to boiler I&O manual). **See Figure 3-6.**

TPI connected to NTI Trinity LX Boiler - The LX provides DHW priority. To connect the TPI to an LX boiler, wire the TPI 24VAC input to LX contacts "COM" and "R"; connect TPI output contacts (Pump/TT) to LX DHW input terminals, "DHW" and "Sensor COM". Refer to boiler application manual, Appendix B. **See Figure 3-7.**

TPI connected to Zone Valve - Typically used in applications where the boiler does not accept a dedicated DHW input. 24VAC is provide by a field supplied transformer or via a 24VAC supply from the boiler (refer to boiler I&O manual), TPI output contacts "Pump/TT" complete 24VAC to a zone valve. Zone valve end switch is connected to boiler heat (T-T) input, refer to boiler I&O manual. **See Figure 3-8.**

TPI connected to DHW Priority Zone - 24VAC is provided via the transformer incorporated in the zone controller, refer to zone controller I&O manual for details. TPI output contacts "Pump/TT" are connected to the priority zone input (e.g. Zone 4). Priority for DHW is achieved via the zone controller when the priority switch is activated. **See Figure 3-9.**

Figure 3-6 TPI wired to Boiler with DHW Input

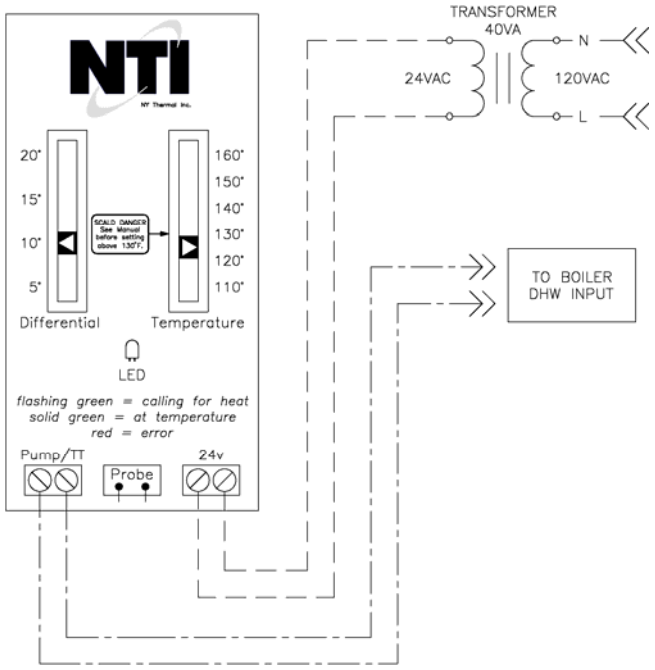


Figure 3-7 TPI wired to NTI Trinity LX Boiler

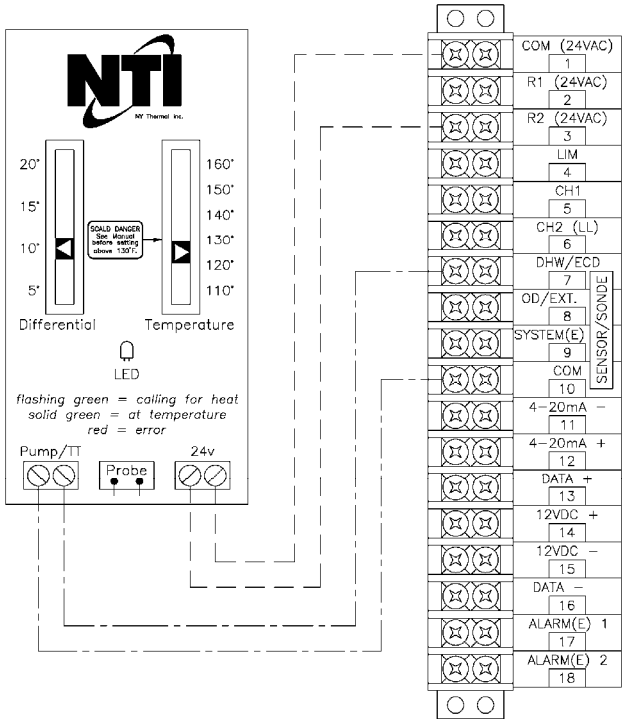


Figure 3-8 TPI wired to Zone Valve

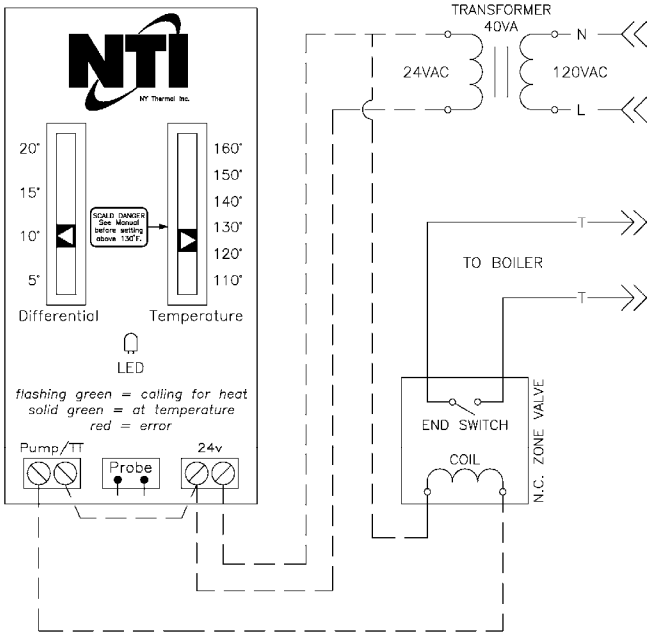
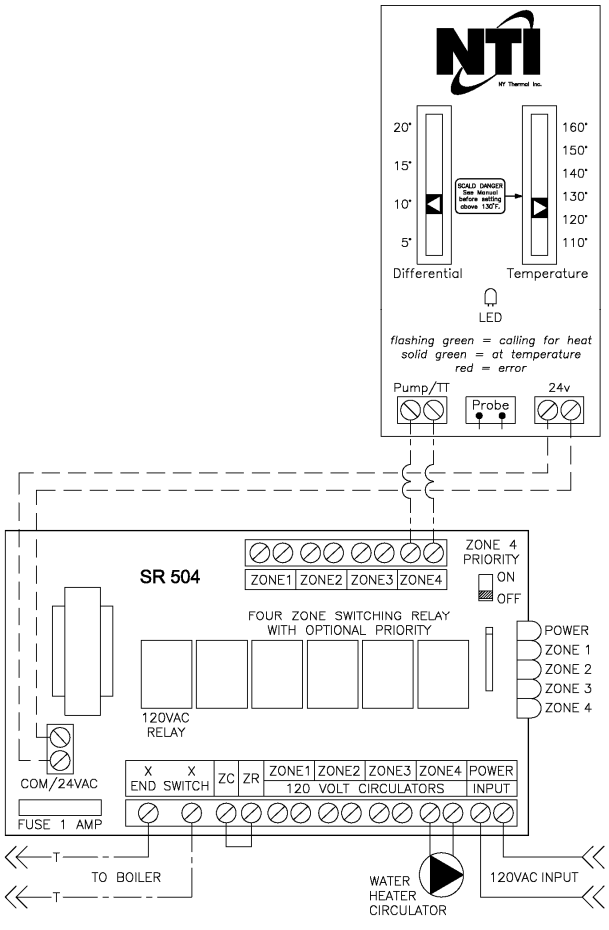


Figure 3-9 TPI wired to DHW Priority Zone Controller



4.0 START UP AND CHECK OUT

Filling the Water Heater

1. Thoroughly flush the water heater so that three (3) times the tank's volume has been drawn through it.
2. Verify water connections completed.
3. Close drain valve. Open highest hot water faucet.
4. Open cold water inlet valve and fill system.
5. Fill until a steady stream of water flows from the faucet.
6. Close the hot water faucet.
7. Ensure the boiler and domestic piping is free of leaks before proceeding to operational checklist.

Operational Checklist ☑

1. Ensure all electrical connections are made correctly and no high voltage wires are exposed.
2. Set the TPI immersion thermostat (aquastat) to the desired temperature.
3. Verify that there is power to the TPI Thermostat Control.
4. Ensure that the tank is filled with water.
5. Ensure that the tank's heat exchanger coil(s) are filled with water or heat transfer fluid.
6. Ensure piping system is free of leaks and that air has been purged from system.
7. Initiate a call for domestic hot water by opening hot water taps on domestic water fixtures.
8. Verify that the boiler starts when the aquastat calls for heat and shuts down when water heater is satisfied.
9. Verify circulator and zone valve operation during an aquastat call for heat and DHW priority. Allow zones to operate long enough to purge any remaining air from the system.
10. Check for proper operation of relief valve by opening it manually.
11. If T&P relief valve functions continuously during normal thermal expansion, the expansion tank may need to be upsized.

5.0 ANNUAL MAINTENANCE AND INSPECTION

Inspection Checklist ☑

1. Perform a visual inspection of all valves, drains, and system piping for signs of leaks.

Maintenance Checklist ☑

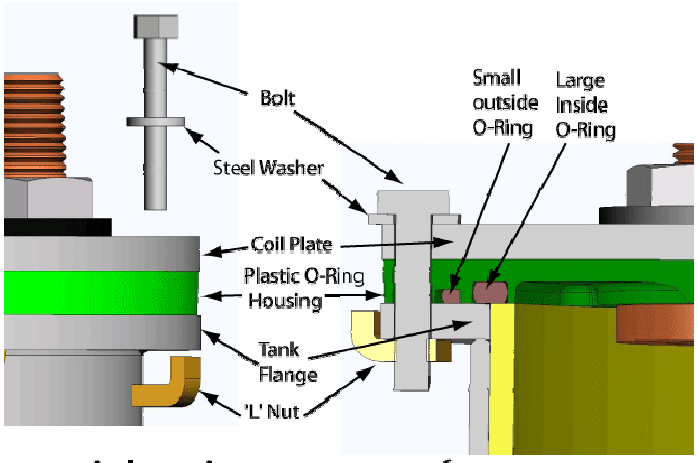
1. Verify maximum water temperature at hot water fixtures to verify mixing valve temperature settings.
2. Manually operate T&P relief valve by moving lever to open position until hot water is released and allow it to snap close. If closed relief valve continues to leak, close cold water inlet, drain tank, and replace relief valve.
3. If T&P relief valve functions continuously during normal thermal expansion, the expansion tank may need to be upsized.
4. Ensure that boiler and/or solar thermal system is maintained in accordance with their installation manuals.
5. Check function of field-installed controls, thermostats, and circulators.
6. Check tank PH and chloride levels to determine if water chemistry is within the specified range.
7. Any additional procedures required by local codes.

Draining the Water Heater

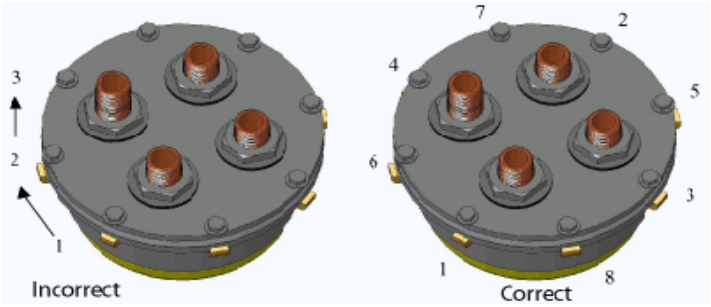
1. Disconnect the power supply to the heat source.
2. Close the cold water supply shut off valve.
3. Allow appliance to cool before servicing to avoid burns.
4. Open the drain valve and divert water in tank to alternate storage location or floor drain.
5. Open highest hot water faucet to allow air to enter the system.

Reinstalling the Heat Exchanger - The "SL" Series of indirect water heaters has a removable heat exchanger coil which can be accessed from the top of the unit. Refer to Figure 4-1 and corresponding installation checklist for instructions on reinstalling the coil.

Figure 4-1 Reinstalling the SL Series Heat Exchanger



Proper tightening sequence for top mount coil



Installation Checklist ☑

1. Turn off power to unit and heat source.
2. Shut off water supply to tank and boiler.
3. Allow appliance to cool before servicing.
4. Remove heat exchanger coil from the tank.
5. Flush inside of heat exchanger with water.
6. Rinse outside of heat exchanger with water and scrub with soft bristled brush.
7. Install heat exchanger. Ensure o-ring housing is installed properly.
8. Complete the following steps, 9 through 12, to reinstall the coil plate.
9. Place the nut beneath the flange opening.
10. Hold the nut in place with one hand - insert the bolt with the other.
11. Be sure to place bolts in all of the openings.
12. Thread the bolt into the nut and tighten in proper sequence as shown. Excessive force is not required to seal properly.
13. Turn on the water and bleed the air from the system.

6.0 PARTS LIST

Table 6-1 Indirect Water Heater

Item	Part #	Models	Description
1	84156	All Series (S, S-SR,	Relief Valve, T&P, ¾", 150 psi
2	84158	All Series (S, S-SR,	Controller, Water Heater, TPI
3	84217	SL-35, SL-50	Coil, 35/50 Gal
4	84218	SL-70	Coil, 70 Gal
5	84219	SL Series	O-ring 6 1/4" ID for Coil
6	84220	SL Series	O-ring 6 3/4" ID for Coil

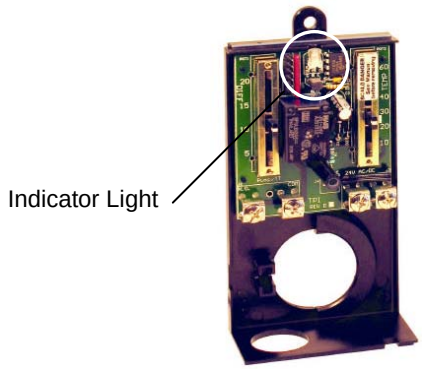
IMPORTANT

Trin & Stor parts available at any stocking wholesaler. Installers needing technical assistance can contact NTI directly at 1-800-688-2575.

7.0 TROUBLESHOOTING

Locate the TPI indicator light at the top of the case as shown. Refer to Table 7-1 for TPI troubleshooting guide.

Figure 7-1 TPI Thermostat



Indicator Light Status	
Unlit	No power to unit.
Solid Green	Powered. Temperature is in range. No demand. Demand satisfied. Pump/TT output should be open.
Flashing Green	Calling for heat. Temperature is out of range. Pump/TT output should be closed.
Flashing Red	TPI has sensed failure. Replace TPI module.

NY Thermal Inc. 65 Drury Cove Road Saint John, NB E2H 2Z8 Canada
Technical Assistance: 1-800-688-2575
Website: www.nythermal.com
Fax: 1-506-432-1135